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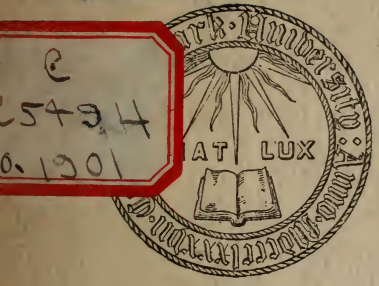

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Clark University,
in the City of Worcester,
Massachusetts.

Register and Thirteenth Official Announcement.

1901.

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CLARK UNIVERSITY,

WORCESTER, MASS.

REGISTER

AND

Thirteenth Official Announcement.

WORCESTER, MASS.
PUBLISHED FOR THE UNIVERSITY.
March, 1901.

CALENDAR. 1901-1902.

1901.

April 1.	Monday, A. M.	Spring Recess.
– 6.	Saturday, P. M.	
April 19.	Thursday,	Patriots' Day.
May 30.	Thursday,	Memorial Day.
June 20.	Thursday P. M.	Twelfth academic year closes.
Sep. 26.	Thursday A. M.	Thirteenth academic year begins.
Nov. 28.	Thursday,	Thanksgiving Day.
Dec. 21.	Saturday A. M.	Christmas Recess.
1902.		
Jan. 1.	Wednesday P. M.	
Feb. 1.	Saturday,	Founder's Day.
Feb. 22.	Saturday,	Washington's Birthday.

Jonas Gilman Clark

Founder

of the

University

Born in Hubbardston February 1 1815

Died in Worcester May 23 1900

Clark Univ., Worcester, Mass.

HP4759

MEMBERS.

G. STANLEY HALL, PH. D., LL. D., 94 Woodland St.
President of the University and Professor of Psychology.

A. B., Williams College, 1867, and A. M., 1870; Ph. D., Harvard University, 1878; Lecturer in Harvard and Williams Colleges, 1880-81; Professor of Psychology, Johns Hopkins University, 1881-88; LL. D., University of Michigan, 1888, and Williams College, 1889. Resident Fellow of the American Academy of Arts and Sciences; Resident Member of the Massachusetts Historical Society.

WILLIAM E. STORY, PH. D., 17 Hammond St.
Professor of Mathematics.

A. B., Harvard University, 1871; Ph. D., Leipzig, 1875; Parker Fellow (Harvard), 1874-75; Tutor of Mathematics, Harvard University, 1875-76; Associate, Assistant Professor, and Associate Professor of Mathematics, Johns Hopkins University, 1876-89. Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

EDMUND C. SANFORD, PH. D., 45 Hollywood St.
Professor of Experimental and Comparative Psychology.

A. B., University of California, 1883; Fellow, Johns Hopkins University, 1887; Ph. D., Johns Hopkins University, 1888; Instructor in Psychology Johns Hopkins University, 1888; Instructor in Psychology, Clark University, 1889-92; Assistant Professor, 1892-1900.

ARTHUR G. WEBSTER, PH. D., 936 Main St.
Professor of Physics.

A. B., Harvard University, 1885; Instructor in Mathematics, Harvard University, 1885-86; Parker Fellow, 1886-89; Student, Universities of Berlin, Paris, Stockholm, 1886-90; Ph. D., Berlin, 1890; Docent in Physics, Clark University, 1890-92; Assistant Professor, 1892-1900. Resident Fellow of the American Academy of Arts and Sciences.

CLIFTON F. HODGE, PH. D., 3 Charlotte St.
Assistant Professor of Physiology and Neurology.

A. B., Ripon College, 1882; Fellow in Biology, Johns Hopkins University, 1888-89; Ph. D., Johns Hopkins University, 1889; Fellow in Psychology, and Assistant in Neurology, Clark University, 1889-91; Instructor in Biology, University of Wisconsin, 1891-92.

HENRY TABER, PH. D., 65 West St.
Assistant Professor of Mathematics.

Ph. B., Yale University, 1882; Ph. D., Johns Hopkins University, 1888; and Assistant in Mathematics, Johns Hopkins University, 1888-89. Member of the London Mathematical Society; Resident Fellow of the American Academy of Arts and Sciences.

WILLIAM H. BURNHAM, PH. D., 100 Chatham St.
Assistant Professor of Pedagogy.

A. B., Harvard University, 1882; Instructor in Wittenberg College, 1882-83 Instructor in the State Normal School, Potsdam, N.Y., 1883-85; Fellow, Johns Hopkins University, 1885-86; Ph. D., 1888, and Instructor in Psychology, 1888-89; Docent in Pedagogy, Clark University, 1890-92; Instructor, 1892-1900.

ALEXANDER F. CHAMBERLAIN, PH. D., 12 Shirley St.
Acting Assistant Professor of Anthropology.

B. A., University of Toronto, Canada, 1886; M. A., University of Toronto, 1889; Fellow (tutorial and post-graduate work) in Modern Languages in University College, Toronto, 1887-90; Examiner in Modern Languages, University College, and the University of Toronto, 1888-92, University of Trinity College, Toronto, 1890-91, Department of Education, Ontario, 1888-89; Fellow in Anthropology, Clark University, 1890-92; Ph. D., *ibid.*, 1892; and Lecturer in Anthropology, 1892-1900. Anthropological Researches in British Columbia under the auspices of the British Association for the Advancement of Science, summer of 1891; Associate Editor *American Antiquarian;* Editor *Journal of American Folk-Lore.*

JOSEPH DE PEROTT, 5 Gates St.
Docent in Mathematics.

Student, Universities of Paris and Berlin, 1877-80.

HERMAN T. LUKENS, PH. D., California, Pa.
Docent in Pedagogy.

A. B., University of Pennsylvania, 1885, A. M., 1888; Student in Halle, Jena and Berlin, 1888-91; Ph. D., Jena, 1891; Teacher of Biology in Northwest Division High School, Chicago, 1891-94; Honorary Fellow in Psychology, Clark University, 1894-95; Lecturer in Education, Bryn Mawr College, 1896-97; Visited European Institutions, 1897-98; Professor of Psychology and Pedagogy, State Normal School, California, Pa., since 1898.

ADOLF MEYER, M. D., 81 Chatham St.
Docent in Psychiatry.

Maturitätsexamen, Gymnasium, Zürich, Switzerland, 1885; Medical Staatsexamen, Zürich, 1890; Graduate Student in Medicine in Paris, Edinburgh and London, 1890-91; Neurological work in the laboratory of the clinic of psychiatry of Professor A. Forel, Zürich, 1891; Neurological Student, Vienna, 1892; Doctor of Medicine, University of Zürich, 1892; Docent in Neurology, University of Chicago, and Pathologist at the Illinois Eastern Hospital for the Insane, 1893-95. Pathologist and Neurologist, Worcester Lunatic Hospital, since 1895.

EZRA ALLEN, A. M., Coudersport, Pa., 87 Woodland St.
Fellow in Pedagogy.

A. B., Bucknell University, 1895; A.M., 1896; Instructor in Science, Perkiomen Seminary, Pa., 1896-1900.

FRANK K. BAILEY, B. S., Leadville, Col., 9 Wyman St.
Fellow in Physics.

B. S., Colorado College, 1898; Scholar, Clark University, 1898-99; Fellow, 1899-1900.

SANFORD BELL, A. M., Bloomington, Ind., 23 Maywood St.
Fellow in Psychology.

Graduate, State Normal School, Terre Haute, Ind., 1894; Supt. of Schools, Aurora, Ind., 1895-96; Professor of Psychology, Northern Indiana Normal School, 1896-98; A. B., Indiana University, 1899; A. M., 1900; Assistant Professor of Pedagogy, Indiana University, 1898-1900.

ALBERT M. BLAISDELL, B. S., Bradford, N. H.,
Fellow in Mathematics. 75 Florence St.

B. S., Brown University, 1899; Scholar, Clark University, 1899-1900.

TREADWELL CLEVELAND, JR., A. M., West Orange, N. J.,
Fellow in Psychology. 879 Main St.

A. B., Williams College, 1897; A. M., Columbia University, 1898; Fellow in Psychology, Clark University, Sept., 1900-Jan., 1901.

D. ELLIS DOUTY, B. S., Seattle, Washington, 9 Wyman St.
Fellow in Physics.

B. S., University of Washington, 1892; Assistant in Physics, Laboratory University of Washington, 1895-96; Tutor in Physics, 1896-98; Scholar, Clark University, 1898-99; Fellow, 1899-1900.

CLEMENS JAMES FRANCE, A. B., Johnston, N. Y.,
Fellow in Psychology. 70 Florence St.

A. B., Hamilton College, 1898; Scholar, Clark University, 1898-99; Fellow, 1899-1900.

JESSE NEVIN GATES, A. M., Lena, Ill., 70 Florence St.
Fellow in Mathematics.

A. B., Northwestern University, 1897; A. M., 1899; Instructor in Mathematics, Parker College, Minn., 1899-1900.

JOHN A. HANCOCK, M. A., Nevada City, Cal., 12 Tirrell St.
Fellow in Psychology.

B. S., Baker University, 1877; Principal of Schools, Indiana and Wisconsin, 1877-89; Graduate Student in Pedagogy, University of Wisconsin, 1889-90; M. L., *ibid.*, 1890; City Superintendent, Green Bay, Wis., 1890-92; Graduate Student in Pedagogy, Leland Stanford, Jr., University, 1892-93; M. A., *ibid.*, 1893; Fellow in Pedagogy, Clark University, 1893-94; Superintendent of Schools, Durango, Col., 1894-97; Assistant Professor (*pro tem.*) of Psychology, University of Colorado, 1897-98; Pr. H. S., Santa Barbara, Cal., 1899-1900; Fellow in Psychology, Clark University, Feb., 1901.

S. B. HASLETT, A. B., 4 Crown St.
Fellow in Psychology.

Graduate of the Edinboro (Pa.) State Normal School, 1885; Principal of Creighton (Pa.) Public Schools, 1887-88; A. B., Grove City College, Pa., 1889; Principal Braddock High School, 1890-91; Graduate Allegheny Theological Seminary, 1892; A. M., Grove City College, 1896; Presbyterian Ministry, 1892-98; Scholar, Clark University, 1898-1900.

JAMES EDMUND IVES, Philadelphia, Pa., 1018 Main St.
Fellow in Physics.

Assistant Curator, Academy of Natural Sciences, Pa., 1887-93; Instructor in Physics, Drexel Institute, Pa., 1893-97; Jessup Student, Academy of Natural Sciences, Phila., 1887-91; Student in Histology and Embryology, University of Pennsylvania, 1888-89; Student in Mathematics, 1893-95; Student in Physics, Harvard University, summer of 1894; Student in Physics, Cavendish Laboratory, Cambridge, England, 1896; Scholar, Clark University, 1897-98; Fellow, 1898-1900.

HERBERT G. KEPPEL, A. B., Zeeland, Mich., 44 Richards St.
Fellow in Mathematics.

A. B., Hope College, 1889; Instructor in Mathematics, Northwestern Classical Academy, Orange City, Ia., 1891-92; Scholar in Mathematics, Clark University, 1892-93; Fellow, 1893-95; Instructor in Mathematics, Academy of Northwestern University, 1895-96; Instructor in Mathematics, Northwestern University, 1896.

ANDREW J. KINNAMAN, Bloomington, Ind.,
Fellow in Psychology. 87 Woodland St.

Graduate, Central Normal College, Danville, Ind., 1885; Instructor, Central Normal College, 1885-93; Graduate of School of Ped., New York University, 1894; Department of Pedagogy, Central Normal College, 1894-99; A. B., Indiana University, 1900.

M. F. LIBBY, B. A., Toronto, Canada, 12 Tirrell St.
Honorary Fellow in Psychology.

B. A., Victoria University, Toronto, 1890; English Specialist, Toronto Collegiate Institute, 1890-96; Student in Universities of Göttingen and Berlin, 1897-1900.

LILLIE J. MARTIN, A. B., Stanford University, Cal.,
Assistant to Dr. Sanford in the Psychological Laboratory.
15 Florence St.

A. B., Vassar College, 1880; Teacher, Indianapolis High School, 1880-89; Vice-Principal and Head of the Department of Science, Girls' High School, San Francisco, 1889-94; Student in Göttingen University, 1894-98; Assistant Professor of Psychology and acting Head of the Department of Psychology, Leland Stanford, Jr., University, 1899-1900; Assistant Professor of Psychology, 1900; Assistant to Dr. Sanford in the Psychological Laboratory, Clark University, Jan. 1, 1901.

HALCOTT C. MORENO, A. M., Gainesville, Ga.,
Assistant to Professor Story. 70 Florence St.

A. B., University of Georgia, 1893; A. M., 1894; B. L., 1896; Tutor in Mathematics, 1893-97; Scholar, Clark University, 1897-98; Fellow, 1898-1900.

EDWIN LEE NORTON, PH. D., Northfield, Minn.,
Fellow in Psychology and Pedagogy. 12 Tirrell St.

A. B., Amherst College, 1893; Teacher, Birmingham, Ala., 1894-95; Teacher, Duluth High School, 1895-96; A. M., Harvard University, 1897; Ph. D., 1900.

CHARLES H. SEARS, PH. D., West Brewster, Mass.
Hon. Fellow in Psychology and Pedagogy. 1018 Main St.

Graduate Four Years' Course, State Normal School, Westfield, Mass., 1883; A. M., Alleghany College, 1893; and Ph. D., 1895; Principal of Public Schools, Cheshire, Mass. 1883-85; Teacher, Prospect Park Institute, Brooklyn, N. Y., 1885-88; Teacher of Latin, State Normal School, Edinboro, Pa., 1888-92; Principal, Normal Department, Claflin University, 1892-97; Hon. Fellow, Clark University, 1897-1900; Instructor in Psychology and Pedagogy, State Normal School, Westfield, Mass., 1900-1901.

WILLARD STANTON SMALL, A. M., 5 Lowell St.
Honorary Fellow in Psychology.

A. B., Tufts College, 1894; Tufts Divinity School, 1894-96; Professor of English Language and Literature, Lombard University, 1896-97; A. M., Tufts College, 1897; Scholar, Clark University, 1897-98; Fellow, 1898-1900; Lecturer in Psychology and Pedagogy, Oread Institute, Worcester, 1899.

MARGARET K. SMITH, PH. D., Boston, Mass.,
Honorary Fellow in Psychology. 41 Maywood St.

Graduate, State Normal School, Oswego, N. Y., 1883; Instructor in Pedagogy, State Normal School, Peru, Neb., 1883-85; Student, Stoy-Herbart School of Pedagogy, Jena, 1885-87; Instructor in Psychology and Pedagogy, Oswego Normal School, 1887-96; Student in Europe, 1896-1900; Ph. D., University of Zürich, 1900.

MYRON W. STICKNEY, A. M., Brownville Me.,
Fellow in Biology. 44 Richards St.

A. B., Bates College, 1893; A. M., Brown University, 1895; Graduate Student, Brown University, 1896-97; Instructor in Science, Worcester Academy, 1898-1900.

CARL VERNON TOWER, PH. D., South Hingham, Mass.,
Assistant to President Hall. Hotel Pleasant.

A. B., Brown University, 1893; A. M., 1895; Instructor in Philosophy, Brown University, 1895-96; Fellow in Philosophy, Cornell University, 1896-97; Ph. D., Cornell University, 1898; Instructor in Philosophy, University of Michigan, 1898-1900.

NORMAN TRIPLETT, PH. D., Perry, Ill., 7 Gates St.
Honorary Fellow in Psychology.

A. B., Illinois College, 1889; Principal, New Berlin (Ills.) School, 1889-91; Practiced Law, 1891-94; Instructor in Physics, Chemistry and Psychology, Quincy (Ills.) High School, 1894-97; A. M., Indiana University, 1898; Fellow, Clark University, 1898-99; Fellow and Assistant, 1899-1900; Ph. D., 1900; Instructor in Pedagogy, Mt. Holyoke College, 1900-1901.

JOHN N. VAN DER VRIES, A. M., Grand Rapids, Mich.
Fellow in Mathematics. 22 May St.

A. B., Hope College, 1896; A. M., 1899; Principal of School, East Saugatuck, Mich., 1896-97; Scholar, Clark University, 1897-98; Fellow, 1898-1900.

FRANK B. WILLIAMS, M. S., Warrensburg, Mo.,
Fellow in Mathematics. 23 Maywood St.

C. E., Missouri State University, 1890; Teaching Fellow in Mathematics, Missouri State University, 1892-93; M. S., Missouri, State University, 1893; U. S. Asst. Engineer, Tennessee River Improvement, 1895-97; Scholar, Clark University, 1897-98; Fellow, 1898-1900; Assistant Professor of Civil Engineering, Union College, Dec. 1, 1900.

C. A. BOARDMAN, Clinton, Mass.
Special Student in Psychology.

Student, Int. Y. M. C. A. Training School, Springfield, Mass., 1895-1900; Physical Director, Y. M. C. A., Clinton, Mass., 1900.

ROBERT CLARK, A. B., 23 Maywood St.
Scholar in Pedagogy.

A. B., Amherst College, 1892; Teaching, 1892-97; Scholar in Pedagogy, Clark University, Jan., 1898, June, 1899; Teacher in Passaic (N. J.) and Holyoke (Mass.) Schools, 1899-1900; Scholar in Pedagogy, Clark University, Dec. 1, 1900.

JOSEPH G. COFFIN, B. S., Boston Mass., 70 Florence St.
Scholar in Physics.

Student, Collège Chaptal, Paris, 1892-94; B. S., Mass. Institute of Technology, 1898; Assistant to Professor Cross, Massachusetts Institute of Technology, 1898-1900.

JOSIAH MOSES, A. M., Manchester, Va., 2 Davis St.
Scholar in Psychology.

A. B., Richmond College, 1899; A. M., 1900.

WILLIAM M. POLLARD, New Braintree, Mass.
Special Student in Psychology and Pedagogy.

A. B., Amherst, 1900.

FREDERICK H. SAUNDERS, Worcester, Mass., 18 Gates St.
Scholar in Pedagogy.

Graduate, State Normal School, Prov., R. I., 1883; Principal of Grammar Schools, Westerly, R. I., 1884-87; Braintree, Mass., 1887-91; River Point, R. I., 1892-95; Bristol, R.I., 1896-98; Scholar in Pedagogy, Clark University, Jan., 1900.

ROY T. WELLS, M. S., Foxboro, Mass., 5 Lowell St.
Scholar in Physics.

B. S., Tufts College, 1898, M. S., 1898; Construction Department, N. E. Tel. & Tel. Co., 1898-99; Engineer, General Electric Co., 1899; Instructor in Physics and Mathematics, Hillside (Wis.) Home School, 1899-1900.

GAVIN H. WRIGHT, B. A., Greendale, Mass.
Special Student in Psychology.

B. A., Williams College, 1894; Assistant Principal, Sedgwick Institute, 1894-95; Student, Andover Theological Seminary, 1895-98; B. D., 1898; Congregational Ministry, 1898-.

SATURDAY COURSE.

GEORGE I. CLAPP, A. B.,
Supt. of Schools, Spencer, Mass.

GEORGE F. COLE, A. M.,
Instructor in Modern Languages, English High School, Worcester, Mass.

STEPHEN S. COLVIN, PH. D.,
Instructor in English, English High School, Worcester, Mass.

ALBERT GRAY, A. B.,
Instructor in Greek History, English High School, Worcester, Mass.

EDWARD B. HALE,
Principal High School, Brookfield, Mass.

SAMUEL W. HALLETT, A. B.,
Supt. of Schools, Ware, Mass.

W. H. HOLMES, JR.,
Supt. of Schools, Grafton, Mass.

FLORENCE S. JENKINS,
Teacher, Downing St. School, Worcester, Mass.

M. ROSE McGOWAN,
Teacher, Adams Square School, Worcester, Mass.

EDITH JANET NORCROSS,
A. B., Wellesley College, 1900.

MARY E. SAYWARD,
Instructor in English High School, Worcester, Mass.

LOUISE A. SCOTT,
Teacher, Adams Square School, Worcester, Mass.

FREDERICK W. STAEBNER,
Instructor in Science, State Normal School, Willimantic, Conn.

EDNA RUSSELL THAYER,
Teacher, Downing St. School, Worcester, Mass.

ARABELLA TUCKER,
Instructor in Botany, State Normal School, Worcester, Mass.

LOUIS N. WILSON, 11 Shirley St.
Librarian and Clerk of the University.

ADMINISTRATION.

The trustees are the ultimate source of authority in all matters pertaining to the University. They act collectively through the three committees named below, and also through the president of the University.

BOARD OF TRUSTEES.

Stephen Salisbury,	Frank P. Goulding,
George F. Hoar,	Thomas H. Gage,
Edward Cowles,	Rockwood Hoar,
John D. Washburn,	Charles H. Clark.

OFFICERS.

President, - - -	George F. Hoar.
Treasurer, - - -	Thomas H. Gage.
Secretary, - - -	Frank P. Goulding.

COMMITTEES.

Finance.

Stephen Salisbury,
John D. Washburn, Thomas H. Gage.

Buildings.

Stephen Salisbury.

By-Laws.

John D. Washburn, Stephen Salisbury.

President.

The duties of this office were defined by the Trustees, May 23, 1889, as follows:

The President of the University shall consult frequently with the Trustees on all matters which concern the welfare of the University, and attend the meetings of the Board. He shall confer with each instructor concerning the development of his department, determine the duties and authority of each, and preside at the meetings of the Faculty. He shall be the authorized medium of communication between the Board of Trustees and the officers of instruction, individually and collectively, in all matters involving the administration of the University. The enactments of the Board concerning instructors and their work, and all requests, complaints and proposals from the Faculty to the Trustees shall be made known through him. He shall exercise or provide such superintendence over buildings, apparatus, books and other property, as will secure their protection and appropriate use. Expenditures must not be ordered by any instructor of the University without his previous consent or the express authority of the Board.

These duties were more fully defined by By-Laws enacted by the Corporation Sept. 26, 1889.

FACULTY.

By action of the Trustees, the Faculty Staff has been organized as follows:

I. University Senate.

Whose duty it is to elect fellows and to take

action upon general requirements for the Doctor's degree and other promotions, and to act and advise upon matters officially submitted to them.

II. General Faculty.

Whose duty it is to consider all matters not otherwise provided for, and in which all departments of the University are alike interested.

III. The Library Committee.

To be appointed by the President or Trustees, the duty of which shall be to advise concerning the arrangement, cataloguing and use of books, and other matters pertaining to the library not reserved to the Trustees or otherwise provided for.

GENERAL STATEMENTS.

The University now consists of a group of five closely related departments, in which all its work and that of instructors, fellows and scholars is grouped. These departments are as follows:

I. MATHEMATICS.
II. PHYSICS.
III. CHEMISTRY.
IV. BIOLOGY.
V. PSYCHOLOGY.

In addition to these *Education* is now a sub-department of Psychology.

ADMISSION.

Graduate students only are admitted, or those of equivalent attainments, except in rare and special cases. At present no entrance examinations are required; but by testimonials, diplomas, personal interviews, or written specimens of work, the authorities must be satisfied that the applicants have scholarship enough to work to advantage, and zeal and ability enough to devote themselves to their chosen field. The methods of the University

are too costly, and its energy and funds too precious, to be spent upon those who are not well trained, promising and in earnest.

It is highly desirable, and will probably before long be required, that candidates entering any of the five departments shall have, besides a knowledge of the other subjects commonly taught in colleges, a reading knowledge of French and German.

For the select students who are received, it is the purpose of the University to open all its privileges and to supply every incentive possible in the way of books, facilities, and, above all, direct personal stimulus and instruction. The chief, as well as the best, work of this University is individual and involves daily suggestion, encouragement and direction.

Classes of Appointees.

No clearly marked line exists between students and instructors. Fellows and scholars who have attained some degree of mastery in a special line of work give brief special courses, which are often attended by professors. This is a stimulus to the student, and both tests and exhibits power in teaching.

I. Docents.

The highest annual appointment is that of Docent. These positions are primarily honors, and are reserved for the few whose work has already marked a distinct advance beyond the Doctorate and who wish to engage in research. They are not assistants, and their relations are directly with the President of the University.

Docents may be provided with individual rooms, and special apparatus may be purchased for their work if desired and approved. While they will be expected to deliver a limited number of lectures on some special chapter of their department, their time will be mainly reserved for study and research in a way best adapted to qualify them still more fully for academic advancement.

These positions are official appointments. Appointees, or others found worthy, however, may be formally invested with the *licentia docendi*, the terms of which can be furnished on application and which requires a memoir or essay representing original work in their department, but no examination. This highest formal academic honor will be strictly reserved for those of marked scientific attainment and teaching ability and, so far as this diploma can have the significance of a

title or degree, it will be regarded by the University as a brevet collegiate professorship.

It is believed that the difficulties under which college trustees sometimes succumb in selecting suitable professors may be diminished by the existence of such a select body of scholars of guaranteed scientific training, ability and approved power to teach, and that otherwise this new grade will aid in raising the standard of academic scholarship in colleges and in encouraging scientific research here. Appointees of this class may be paid a salary.

II. Candidates for the Degree of Doctor of Philosophy.

At least two, and in most cases three, years of graduate work will be necessary for this degree. Examinations for it, however, may be taken at any time during the academic year when, in the judgment of the University authorities, the candidate is prepared. A prearranged period of serious work at the University itself is indispensable.

For this degree the first requirement is a dissertation upon an approved subject, to which it must be an original contribution of value. To this capital importance is attached. It must be

reported on in writing by the chief instructor before the examination, printed at the expense of the candidate, and at least one hundred copies given to the University. In case, however, of dissertations of very unusual length, or containing very expensive plates, the Faculty shall have power, at the request of the candidate, to reduce this number of presentation copies to fifty.

Such formal or informal tests as the Faculty shall determine shall mark the acceptance of each student or fellow as a candidate for this degree. One object of this preliminary test shall be to insure a good reading knowledge of French and German. Such formal candidature shall precede the examination itself by at least one academic year. (See special rules below.)

The fee for the Doctor's degree is $25, and in every case it must be paid and the presentation copies of the dissertation must be in the hands of the Librarian before the diploma is given. In exceptional cases, and by special action of the Faculty, the ceremony of promotion may precede the presentation of the printed copies of the dissertation.

An oral, but not a written, examination is required upon at least one minor subject in addition to the major before an examination jury composed

of at least four members, including the head of the department and the President of the University, who is authorized to invite any person from within or without the University to be present and to ask questions. The jury shall report the results of the examination to the Faculty, which, if it is also satisfied, may recommend the candidate for the degree.

For the bestowal of this degree, the approbation of the Board of Trustees must in each case be obtained. They desire that the standard of requirements for it be kept the highest practicable, that it be reserved for those of superior ability and attainment only, and that its value be never suffered to depreciate.

It is to the needs of candidates for this degree that the lectures, seminaries, laboratories, collections of books, apparatus, etc., are specially shaped, and no pains will be spared to afford them every needed stimulus and opportunity. It is for them that the Fellowships and Scholarships are primarily intended, although any of these honors may be awarded to others.

On November 14th, 1900, the following vote was passed by the Board of Trustees :

That the University will admit candidates for the degree of Doctor of Philosophy, and will confer that degree, without regard to the distinction of sex.

Special Rules Concerning the Doctor's Degree.

I. *Residence.* No candidate shall receive the degree of Doctor of Philosophy without at least one year's previous residence.

II. *Candidature for the Doctor's Degree.* Every applicant for the Doctor's degree shall fill out, before October fifteenth, the regular application blank provided at the office. This schedule shall be submitted to the head of the department and the instructor in the major subject. Before affixing their signatures they shall satisfy themselves, in such manner as they may desire, as to the fitness of the applicant.

III. When countersigned, this schedule shall be filed with the President, and the applicant will be examined in French and German by the annual Committee for that purpose.

IV. In case of a favorable report by this committee, the applicant shall be a regular candidate for the degree.

V. Candidates complying with all preliminary conditions, including the examinations in French and German, before November first will be allowed to proceed to the doctor's examination at any time between May fifteenth following and the end of the academic year.

VI. *The Doctor's Dissertation.* The dissertation must be presented to the instructor under whose direction it is written, and reported upon by him before the doctor's examination. In every case the dissertation shall be laid before the jury of examination, at the time of examination, in form suitable for publication. This provision shall not, however, preclude the making of such minor changes later as the chief instructor may approve.

VII. The dissertation shall be printed at the expense of the candidate and the required copies deposited with the Librarian within one calendar year after the first of October following the examination. The candidate alone will be held responsible for the fulfilment of these conditions.

VIII. The favorable report of the chief instructor, filed in writing with the Clerk of the University, shall be a sufficient imprimatur or authorization for printing as a dissertation. The printed copies shall bear upon the cover the statement of approval in the following words, over the name of the chief instructor:

> A Dissertation submitted to the Faculty of Clark University, Worcester, Mass., in partial fulfilment of the requirements for the degree of Doctor of Philosophy, and accepted on the recommendation of
>
> (NAME OF CHIEF INSTRUCTOR).

IX. *Examinations for the Doctor's Degree.* The examinations for the doctor's degree may be held at any time during the academic year, provided that at least one academic year has elapsed since the completion of the preliminaries of candidature, except in the case of fulfilment of these conditions between the beginning of any academic year and November first of that year, to which case Rule V applies. The examinations shall be held at such hours and places as the President may appoint.

X. Examinations may also be held during the regular vacations of the University, but for these an additional fee of five dollars to each examiner and the reasonable travelling expenses of any examiners who are out of town, all payable in advance, will be required.

XI. All these special rules shall go into force immediately, as far as practicable, and shall govern all applicants for degrees in the academic year 1900–1901 and thereafter.

III. Special Students not Candidates for a Degree.

Any one desiring to undertake a special and approved line of research, and whose attainments are such as to satisfy the requirements of the

University, may also be received. This class includes persons who may desire to devote themselves exclusively to one or more of the special branches—mathematics, physics, chemistry, biology, psychology, or education,—but who do not care to martriculate or become candidates for a degree.

These students, provided they satisfy the heads of the departments of their training and competency in one subject, in which they must be advanced (although they may be less so, or even beginners, in other subjects), may be allowed entire freedom in their choice and combination of studies, and as special students may enjoy all the privileges of the University.

These students may, with the approval of the President, be received for less than an entire year.

IV. Preliminary Candidates.

Non-university students of less special or less advanced standing than the above three classes who are nearly, if not quite, qualified to become candidates for the degree of Doctor of Philosophy may also be received.

Students of this class must, for the present, have completed the work of the first three years of a

regular under-graduate course in a college of good standing, or the equivalent thereof. They must satisfy the authorities of the University of their attainments and that they contemplate advancing to a degree higher than that of A. B. The privileges and status of these students will be more fully defined later. They may, in exceptional cases, be elected to Scholarships.

Fellowships and Scholarships.

Until four years ago the sum of $4,800 was devoted to Fellowships. The plan then was to provide in this way for eight Senior Fellows at $400 each, and eight Junior Fellows at $200 each. In addition to these sums paid to those receiving appointment, the annual fee of $200 was remitted, thus making the value of these Fellowships $600 and $400 each, respectively.

Besides these, sixteen other appointments were made, viz.: eight Senior University Scholarships, remitting all the fee, and eight Junior University Scholarships, remitting one-half the fee.

While the University desires to continue this plan, it has been able for the last four years to approximate it only as far as the reduced funds available for this purpose permitted. The significance of Junior and Senior Fellowships and

Scholarships will, therefore, remain unchanged, but the income of the appointments must be diminished.

A Citizen's Fund.

In addition to this, a citizen of Worcester has given a fund of $5,000, the income of which is to be used for the aid of "some one or more worthy native born citizens of the city of Worcester who may desire to avail themselves of the advantages of the institution."

The Field Fund.

Mrs. Eliza W. Field has also given $500, to be called the "John White Field Fund," the income of which is "to provide for the minor needs of a Scholar or Fellow."

The following regulations apply to the award of the income of the Field Fund:

1. Regard is had to the intellectual ability of the candidate as well as to need of pecuniary assistance.

2 Only candidates who have spent three months at the University are considered.

3. The head of each department will consider and report to the Faculty desirable cases in his department.

4. Applications are received not later than

December 15th, and the awards made as soon as possible after the Christmas recess.

Purpose and Conditions of Fellowships and Scholarships.

Fellowships at Clark University are intended for young men and women of promise who desire to pursue post-graduate studies in order to fit themselves for intellectual careers. It is desirable, but not required, that candidates for these positions should intend to proceed to the degree of Doctor of Philosophy or to equivalent attainments. In general, those intending to devote themselves to some special branch of learning are preferred to those directly fitting themselves for one of the three learned professions, although the latter are not excluded.

Applications should state the candidate's course of study and be accompanied by testimonials or diplomas, should indicate a decided preference for some special department, and, if possible, be accompanied, for the aid of the Board of Selection, by some specimen of work. Applications will be considered in June and in October, and should be in the hands of the President on or before the first of these months. In special cases vacancies may be filled by appointments at any time during

the year. Th enames of unsuccessful candidates will not be made public.

Fellows must reside in Worcester during the entire academic year, devote themselves to special studies under the direction of their instructors, and give such evidence of progress or proficiency before the end of the year as the authorities shall require. It is generally expected that they will undertake some work of research during the year. They must co-operate in promoting harmony, order, and all the ends of the University, must not teach elsewhere, and may be reappointed at the end of the year. Being intended primarily as honors, both Fellowships and Scholarships are awarded without reference to pecuniary needs, so that those able and desiring to do so may relinquish the emolument and retain the title of "Scholar" or "Fellow."

Both Scholarships and Fellowships are open only to students in one or more of the departments announced.

METHODS.

Besides field work, excursions to institutions public and private, coaching and cram-classes, clubs, examinations, conferences and other modes by which knowledge now seems best imparted

and retained, the following educational methods are prominent:

LECTURES. The Trustees desire that each instructor, of however few students, should prepare and deliver regular lecture courses, with diagrams, illustrative apparatus, and reference to standard text-books and the best current literature upon each topic. Advanced students are also encouraged to supplement the work of the professors by giving occasional special lectures and courses. Public lectures will be given from time to time.

SEMINARIES. These are stated meetings for joint, systematic work, under the personal direction of the professor, in some special part of his subject. Here the results of individual reading are reported for the benefit of all; views are freely criticised; new inquiries, methods, comparisons, standpoints, etc., suggested. From the mutual stimulus thus given, many important works have proceeded and the efficiency of universities has been greatly increased.

LABORATORY WORK. For beginners this has been from the first the best of all forms of apprenticeship, bringing student and professor to a closer and mutually stimulating relation. Here the manipulation of apparatus is learned, processes are criticised, results obtained by other investigators

are tested, and methods discussed and perfected, with a view to developing that independence in research which is the consummation of scientific culture.

NOTICES.

The charge for tuition, giving all the privileges of the University, but not covering the laboratory fees, is $100 per annum.

Board and lodging can be obtained near the University at very moderate rates.

Intending students will be given information, so far as possible, upon any of these or other points, in advance of official announcement, upon addressing the Clerk of the University, Mr. Louis N. Wilson, Worcester, Mass.

All members of the University are expected to be present at the opening of each term and to continue in attendance to its close.

The Graduate Club invites all members of the University to become members and to take part in its proceedings.

The following are the statements and announcements of the departments for the academic year, 1901-1902.

I.

MATHEMATICS.

Programme for 1901–1902.

INSTRUCTION IN MATHEMATICS.

The chief aim of the department is to make independent investigators of such students as have mathematical taste and ability; these naturally look forward to careers as teachers of the higher mathematics in colleges and universities, and we believe that the course of training best adapted to the development of investigators is also that which is most suitable for all who would be efficient college professors, even if they do not yet recognize their ability to engage successfully in research. The first essential of success in either of these lines is the habit of mathematical thought, and the direct object of our instruction is the acquisition of this habit by each of our students. With this end in view, we expect every student to make himself familiar with the general methods and most salient results of a very large number of different branches of mathematics, conversant with the detailed results and the literature of a few branches, and thorough master of at least one special topic to the extent of making a real contribution to our knowledge of that subject.

In accordance with these principles, the instruction is given by means of introductory, advanced, and special courses of lectures, seminaries, and personal guidance in reading and investigation.

The introductory courses are given in alternate annual groups, as follows:

Group A:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

THEORY OF FUNCTIONS OF REAL AND IMAGINARY VARIABLES, ELLIPTIC FUNCTIONS, AND DEFINITE INTEGRALS; 5 hours a week through the year.

THEORY OF NUMBERS; 2 hours a week, one half-year.

MODERN SYNTHETIC GEOMETRY; 2 hours a week, one half-year.

Group B:

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES; 3 hours a week, through the year.

DIFFERENTIAL EQUATIONS, AND CALCULUS OF VARIATIONS; 5 hours a week, through the year.

ALGEBRAIC SUBSTITUTIONS AND THEIR APPLICATION TO THE THEORY OF EQUATIONS; 2 hours a week, one half-year.

ANALYTIC GEOMETRY OF HIGHER SURFACES AND TWISTED CURVES; 2 hours a week, one half-year.

ALGEBRAIC INVARIANTS; 2 hours a week, one half-year.

It will be observed that the first course in each group is the same; that course alone is given annually, while the other courses are given but once in two years. It is expected that every student will take each course (unless he has already completed an equivalent course elsewhere) in the earliest year of his residence in which it is given. The chief object of these courses is to make the student familiar with the various methods of mathematical research and the concepts of mathematical thought at the present day. Thus, for example, the conic sections and quadric surfaces are treated by modern methods from the begin-

ning, with adequate consideration of the discoveries of the great geometers of recent times. The usual college courses in the theory of algebraic equations, analytic geometry, and the differential and integral calculus furnish all the necessary preparation for these introductory courses, although it is very desirable that the student be acquainted with the properties of determinants and their application to the solution of linear equations, and with the methods of solving differential equations of the simpler types.

A *Seminary* will be conducted in connection with each group, in which the students will be exercised in individual investigation and the oral presentation of results. The literature of the topics discussed will here receive adequate attention.

Special advanced courses, open to such as have nearly or quite completed the introductory courses, are given annually in subjects varying with the interests of the instructors and the needs of the students.

Each advanced student is placed under the supervision of one of the instructors for guidance in the original investigation of some special topic; the successful issue of this investigation may furnish material for the dissertation required of a candidate for the Degree of Doctor of Philosophy.

For the academic year 1901–02, the following courses are offered:

BY PROFESSOR STORY.

Advanced courses:

HYPERSPACE AND NONEUCLIDEAN GEOMETRY; 3 hours a week, first half-year.

HISTORY OF MATHEMATICS; 20 lectures, second half-year.

SEMINARY FOR ADVANCED STUDENTS; through the year.

Introductory courses:

ANALYTIC GEOMETRY OF HIGHER SURFACES AND TWISTED CURVES; 2 hours a week, first half-year.

ALGEBRAIC INVARIANTS; 2 hours a week, second half-year.

BY ASSISTANT PROFESSOR TABER.

Advanced course:

TRANSFORMATION GROUPS; 2 hours a week, one half-year.

Introductory course:

DIFFERENTIAL EQUATIONS AND CALCULUS OF VARIATIONS; 5 hours a week, through the year.

SEMINARY; through the year.

BY PROFESSOR WEBSTER.

[See announcement of Department of Physics, courses 7, 8, 9, 10.]

BY M. DE PEROTT.

Advanced course:

THEORY OF NUMBERS; 2 hours a week, second half-year.

Introductory course:

ALGEBRAIC SUBSTITUTIONS AND THEIR APPLICATION TO THE THEORY OF EQUATIONS; 2 hours a week, first half-year.

The introductory course in

ANALYTIC GEOMETRY OF CONIC SECTIONS, QUADRIC SURFACES, AND HIGHER PLANE CURVES, will be given 3 hours a week, through the year.

During the academic years 1889-1901, advanced and special courses have been given in:

1. THE HISTORY OF MATHEMATICS among various peoples from the earliest times to A. D. 1650.
2. THEORY OF NUMBERS.
3. LINEAR TRANSFORMATIONS AND ALGEBRAIC INVARIANTS, with applications to algebraic equations and geometry.

4. Theory of Substitutions, with applications to algebraic equations.

5. Plane Analytic Geometry.

6. Solid Analytic Geometry.

7. Hyperspace and Noneuclidean Geometry.

8. Enumerative Geometry.

9. Quaternions, with applications to geometry and mechanics.

10. Multiple Algebra, including matrices, quaternions, the "Ausdehnungslehre," and extensive algebra in general.

11. Modern Synthetic Geometry.

12. Theory of Functions according to Cauchy, Riemann, and Weierstrass, with applications.

13. Weierstrass's Theory of Elliptic Functions.

14. Abelian Functions and Integrals.

15. Numerical Computations.

16. Theory of Quadratic Forms.

17. Analysis Situs, particularly the connectedness of surfaces and map-coloring.

18. Surfaces of the Third and Fourth Orders (analytically treated).

19. Plane Curves of the Third and Fourth Orders (analytically treated).

20. Klein's Icosahedron-Theory.

21. Elliptic Modular Functions.

22. Theta-Functions of Three and Four Variables.

23. Riemann's Theory of Hyperelliptic Integrals.

24. Symbolic Logic.

25. Twisted Curves and Developable Surfaces (torses).

26. Rational and Uniform Transformations of Curves and Surfaces.

27. Theory of Functions of a Real Variable.

28. Definite Integrals and Fourier's Series.

29. Ordinary Differential Equations, including differential equations with infinitesimal transformations, general theory of linear differential equations, Gauss's, Legendre's, and Bessel's functions.

30. Partial Differential Equations, including Laplace's, Bessel's, and Lamé's functions.

31. Finite Differences and Probabilities.

32. Applications of the Infinitesimal Calculus to the Theory of Surfaces.

33. Simultaneous Equations, including Restricted Systems.

34. Theory of Transformation Groups.

35. The Application of Transformation Groups to Differential Equations.

The advanced and special courses are not repeated at regular intervals, but properly prepared students will receive the personal assistance of one or other of the instructors in reading any subject not announced for the year in which they desire to take it.

The number and scope of the advanced courses given each year have been, thus far, regulated by the number of students qualified to profit by them and by the individual interests of the instructors; these courses will be increased, both in number and variety, whenever a real demand for such an increase shall make itself apparent. While the present purely scientific character of the University precludes instruction in strictly technical branches, we hope that the time is not far distant when the demand shall make it advisable, and increased facilities shall make it possible, to announce courses in Descriptive Geometry, Graphical Statics, Mathematical Astronomy, Vital Probabilities, and all the more important applications of mathematics to other sciences and to technical subjects. The applications of mathematics to physics already receive adequate consideration, and the further extension of such applications awaits only a demand for it on the part of students.

Each year seminaries for the training of students in methods of investigation are conducted by the several instructors, and those who have attained the necessary proficiency are personally directed in individual researches, of which the results are published in various mathematical journals.

The degree of Doctor of Philosophy is conferred upon such students as have completed all the introductory courses and a satisfactory number of advanced and special courses, have presented approved memoirs embodying the results of original investigation, and have passed creditable examinations in their principal department of study and in one subordinate department. Mathematical students are generally advised to offer theoretical physics as their subordinate subject, and facilities are given for acquiring the requisite knowledge of this subject during their first or second year at the University.[1] Three years of University work are ordinarily necessary to obtain the degree.

Every facility for the study of special branches will be given to properly prepared students who are not candidates for the doctor's degree, and to those who, having already taken the degree (here or elsewhere), wish to continue mathematical study or investigation.

MATERIAL FACILITIES.

The library is provided with the more important textbooks, treatises, and memoirs on the various branches of mathematics, as well as the principal journals and transactions of learned societies that are devoted to any

[1] For requirements see p. 45.

considerable extent to mathematics. Among the periodicals of which the library has complete or nearly complete sets are the following :

Abhandlungen der Math.-Phys. Classe der Königl. Sächsischen Gesellschaft der Wissenschaften. Leipzig, 1852 to date. Complete.

Comptes Rendus hebdomadaires des Séances de l'Académie des Sciences. Paris, 1835 to date. Complete.

Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. Königl. Preussischen Akad. der Wissen. zu Berlin. 1892 to date.

Nachrichten von der Georg-Augusts-Universität und der Königl. Gesellschaft der Wissenchaften zu Göttingen. 1853-88.

The Philosophical Magazine and Journal of Science (London, Edinburgh and Dublin). 1798 to date. Complete.

Transactions of the Philosophical Society of Cambridge. 1822 to date. Complete.

Philosophical Transactions of the Royal Society. London, 1665 to date. Complete.

Proceedings of the Cambridge Philosophical Society. 1843 to date. Complete.

Proceedings of the Royal Society of London, 1800 to date. Complete.

Acta Mathematica. Stockholm, Berlin and Paris, 1882 to date. Complete.

American Journal of Mathematics. Baltimore, 1878 to date. Complete.

Annals scientifiques de l'Ecole Normale Supérieure. Paris 1864 to date. Complete.

Bulletin des Sciences Mathématiques (Darboux, etc.). Paris, 1870 to date. Complete.

Bulletin de la Société Mathématique de France. Paris, 1873 to date. Complete.

Jahrbuch über die Fortschritte der Mathematik. Berlin, 1868 to date. Complete.

Journal de l'Ecole Polytechnique, etc. Paris, 1794 to date. omplete.

Journal de Mathématiques, pures et appliquées, etc. (Liouville.) Paris, 1836 to date. Complete.

Journal für reine und angewandte Mathematik (Crelle, etc.). Berlin, 1826 to date. Complete.

Mathematische Annalen (Clebsch, etc.). Leipzig, 1869 to date. Complete.

Messenger of Mathematics, Oxford, Cambridge and Dublin. 1862 to date. Complete.

Nouvelles Annales de Mathématiques. Paris, 1842 to date. Complete.

Proceedings of the London Mathematical Society. London, 1865 to date. Complete.

Quarterly Journal of Mathematics, pure and applied. London, 1857 to date. Complete.

Zeitschrift für Mathematik und Physik (Schlömilch, etc.). Leipzig. Complete from Vol. 34 (1888) to date.

Revue semestrielle des Publications Mathématiques. Amsterdam, 1893 to date. Complete.

The University possesses a set of Brill's admirable models (wanting only those published during the last few years, which will be obtained as soon as possible) and Björling's thread models of developable surfaces.

The department possesses also :

An Amsler Planimeter (with revolving table), and a Thomas Arithmometer.

II.

PHYSICS.

PROFESSOR WEBSTER will regularly deliver, with a period of two years, the following cycle of unstarred courses. The starred courses have been given, or will be given at irregular intervals.

1. DYNAMICS. GENERAL PRINCIPLES, CANONICAL EQUATIONS, METHODS OF HAMILTON AND JACOBI, SYSTEMS OF PARTICLES, RIGID BODIES.

2. NEWTONIAN AND LOGARITHMIC POTENTIAL FUNCTIONS, ATTRACTION OF ELLIPSOIDS.

2 a.* FIGURE AND MOTION OF THE EARTH.

3. ELASTICITY, HYDRODYNAMICS, WAVE AND VORTEX MOTION, DYNAMICAL BASIS OF SOUND AND LIGHT.

3 a.* DYNAMICS OF CYCLIC AND OSCILLATORY SYSTEMS, with APPLICATIONS TO THEORY OF ELECTRICITY, SOUND AND LIGHT,

3 b.* THE THEORY OF RESONANCE, AND THE MEASUREMENT OF SOUND.

4. ELECTRICITY AND MAGNETISM.

5. OPTICS, PHYSICAL AND GEOMETRICAL. ELASTIC AND ELECTROMAGNETIC WAVE-THEORIES.

5 a.* COMPARISON OF THE THEORIES OF THE ETHER.

6. THERMODYNAMICS, THERMO- AND ELECTRO-CHEMISTRY, KINETIC THEORY OF GASES, RADIATION.

7. THE PARTIAL DIFFERENTIAL EQUATIONS OF MATHEMATICAL PHYSICS.

Laplace's Equation, Equation of Thermal and Electrical conduction, Equation of Wave-motion, Telegrapher's Equation, Developments in Series, Legendre's, Laplace's Bessel's, and Lamé's Functions.

8*. LINEAR DIFFERENTIAL EQUATIONS.

9.* ELLIPTIC FUNCTIONS, with certain physical applications.

10.* ORTHOGONAL SURFACES AND CURVILINEAR CO-ORDINATES, and their applications.

The courses for the year 1901-2, will be 5, 5 a, 6, 7. (1, 2, 3, and 4 have been given this year.)

(The substance of courses 2, 3 a, and 4 is to be found in Dr. Webster's Lectures on the Theory of Electricity and Magnetism. Macmillan & Co., London and New York.)

In addition to the above courses, there is held a weekly Colloquium, or meeting for the informal discussion of subjects not treated in the lectures, and for the presentation of summaries of important articles appearing in the journals.

A part of the work of the colloquium consists in the systematic presentation of certain classical researches, connected more or less with the lectures, in preparing which the students make use of the original sources of information, thus gaining much experience in methods of research. The work of the colloquium has an excellent effect in training students to present their ideas in a systematic manner before an auditory.

In addition to the lectures announced above, advanced courses may occasionally be given on subjects not included in the list of starred courses.

The aim of the department is to insure in its students some acquaintance with all the various fields of experimental physics, to develop in them the power of exact measurement, to accustom them to exact reasoning from experiment to theory, and to encourage original research conducted on a sound basis. To this end students will be put at work in the laboratory upon experiments of sufficient difficulty to give them skill in measurements of precision, and to enable them to become familiar with the precautions and corrections necessary to be employed in exact work. After a sufficient amount of experience has

been gained, and the student has shown himself to be possessed of sufficient originality to warrant independent investigation, he will be encouraged to take up for himself an original research in the hope of making a personal contribution to science. In this research he will have at all times the benefit of the direction and advice of the professor.

In the belief that no sound knowledge of physics is at the present day possible without a clear appreciation of the means of expressing facts in accurate form, from which exact deductions may be drawn, much stress is laid on the acquisition of familiarity with the application of mathematical analysis to physics, and the courses of lectures are shaped with that end in view. These aim to give the student some acquaintance with the whole field of theoretical physics, to familiarize him with those general methods that appear in the various branches and to show him how he may avail himself of them in practice. It is the constant endeavor in the lectures to bring out the physical essence that is concealed in the formulæ, in order that the student may recognize not merely the formula, in whatever department of physics it may occur, but the physical truth involved. As an instance may be mentioned the treatment of the partial differential equation of Laplace, whose meaning, whether in connection with distributions of Newtonian force, with the steady flow of heat or electricity, certain cases in hydrodynamics and sound, or in the theory of magnetic and electric induction, is physically the same, and indicates what was termed by Faraday the tubular, or solenoidal, distribution of a vector. Further examples are furnished by the

geometrical properties of linear vector functions, of so frequent occurrence, and by the properties of such vector functions that one represents the "curl," or "rotation," of another.

Before all things, however, are made prominent the idea of Energy and its laws, so that in each department the subject is developed as far as possible from the mathematical expression of the energy involved. Physics may be defined as the Science of Energy, and it is attempted, as far as possible, to make each portion of mathematical physics depend upon simple dynamical principles.

The value of a sound knowledge of dynamics to the student of physics cannot be overestimated, and the course in dynamics forms the natural foundation for the remaining courses.

It should be urged upon intending students to prepare themselves, not only in ordinary laboratory measurements, but also in mathematics, the lack of proper mathematical preparation being a serious drawback to the appreciation of the lectures. In particular may be recommended for study not merely those portions of the calculus which deal with the working out of many indefinite integrals, etc., but the theoretical portions which deal with the ideas of partial derivatives, definite integrals, and their practical manipulation, together with enough analytic geometry to involve the properties of lines and *surfaces* of the second order, and a fair amount of the elements of determinants. As suitable text-books for preparation may be recommended to the student Greenhill's, Williamson's, Byerly's, or Lamb's Differential and Integral Calculus, C. Smith's Analytic Geometries, and Hanus's Deter-

minants. Appell, *Éléments de l'analyse mathématique*, may be very strongly recommended to the intending student for study before and during his course at the University.

It cannot be too strongly urged that the student should, from the beginning, be able to read with ease and to make use of works in French and German.

Requirements for the Doctor's Degree.

1 The ability to read at sight specimens of scientific French and German, tested before the first of November preceding the doctor's examination by a committee of two members of the Faculty.

2. The successful passing of an examination upon the general subject of Experimental Physics[1] and upon the subjects named above in the regular course in Theoretical Physics, as a major requirement, together with an examination in one minor subject, to be determined in each particular case by the head of the Physical Department. This subject will be Mathematics or Chemistry.

3. The presentation of a satisfactory dissertation, involving a substantial amount of original work, and forming a contribution of value to pure science. The presentation of the dissertation is a prerequisite to examination.

The time of residence necessary for the proper fulfilment of the above requirements will generally be at least three years, of which at least one will be very largely devoted to work on the dissertation. Students will not be encouraged to enter upon the work of a dissertation until they have acquired sufficient experience to enable them to specialize with advantage.

The aim of the department is to produce physicists rather than electricians, acousticians, opticians, engineers, or narrow specialists of any sort, for although in the nature of things one

[1]Every student is recommended to provide himself with Winkelmann's *Handbuch der Physik* as a work for continual reference.

will be obliged to know more of one subject than of others, yet it seems evident that no thorough knowledge of any branch can be gained without a comprehensive view over the whole subject. Without this the specialist, or the experimentalist lacking a knowledge of mathematics, will continually be falling into pitfalls which the more wary avoid. Furthermore, it can be but a detriment to science to encourage research in new fields by immature and ill-prepared minds and hands.

The following statement is here inserted for the benefit of students of mathematics.

The requirements for the minor in Mathematical Physics may be fulfilled in any one of the following three ways:

1°. By attending the lectures in course 1, as far as Rigid Bodies (about thirty-five lectures at the beginning of course), and courses 2 and 3 (about seventy lectures.)

2°. By reading the introduction, Part I, and sections 158-161 of Dr. Webster's *Lectures on Electricity and Magnetism*, and by attending the lectures in course 3.

3°. By reading P. G. Tait's *Dynamics*, together with Chapter 4 of the above.

Facilities.

The rooms of the Physical Department are on the basement and first floors, and are large and well lighted. On the lower floor or basement are three rooms for work requiring steadiness and freedom from vibration. The first, A, contains the cathetometer made by the Société Genèvoise, securely fastened to the wall, the storage battery and dynamo switch-board, Dr. Webster's drop chronograph,[1] the standard condenser and other apparatus used in determining "*v*," and a large electromagnet, used for researches in magnetism and diamagnetism.[2]

The second room is divided by a partition into two, B and D, each containing heavy piers, D being a room designed for optical work, or for work requiring a steady temperature. In it were

[1] vid. Webster, Physical Review, Vol. VI, 5, 1898.
[2] vid. Wills, Physical Review, April, 1897.

placed the fine Foucault revolving mirror, constructed by Brashear, used in the determination of the velocity of electric waves in wires,[1] with the motor and blower used in driving it. On a second pier is a Rayleigh current weigher for absolute determinations.[2] The room also contains a new apparatus for the measurement of the intensity of sound in free air,[3] and for the photography of sound waves. It is also fitted up as a photographic dark room. In room B are two piers standing in front of the windows, and designed for spectroscopic work. On one of them stands a high speed motor-chronograph[4] and on the other formerly stood the absolute electrometer,[5] and at present are a Michelson interferometer, and a sensitive radiometer for radiation measurements. The room C contains the astronomical clock and balances, and is now used for electrical and thermal measurements. The room E is fitted up as a general workshop, and contains a lathe, planer, jeweller's lathe for lapidary work, machinist's bench and tools. This room communicates with the large room G, in which are placed the engine, dynamo, and other machinery.

The farther end is used as a carpenter shop for pattern-making, etc. H is the battery room, containing forty cells of storage battery, and K is the general boiler room.

On the floor above are three rooms, the first, over A, being at present used for optical work. The next room is the professor's office and also contains cases for the apparatus when not in use, together with a store-room at one end. On the walls is a large collection of blue-prints of mathematical diagrams, the originals of the figures in Dr. Webster's "Electricity and Magnetism." Here are also a number of interesting models used in the teaching of dynamics, thermo-dynamics, electricity, etc., the number of which is continually increasing, and some of which are rarely to be found. Among them are Maxwell's Dynamical Top and several other interesting tops, Rayleigh's Induction model,

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[1] vid. Saunders, Physical Review, Vol. IV, 20, 1896.
[2] vid. Taylor, Physical Review, Vol. VII, 31, 1898.
[3] vid. Webster and Sharpe, A. A. A. S. Report, 1898.
[4] vid. Webster, Am. Jour. Sci., Vol. III, 1897.
[5] vid. Edmondson, Physical Review, Feb. 1897.

Gibbs's and other thermodynamical surfaces. The third room is the lecture-room, and is adorned with Rowland's great spectrum map. All the rooms are wired with several sets of wires from the switch-board, so that direct current of various voltages, and alternating current, may be had at any time.

Special mention should be made of the workshop, which has proved invaluable to the success of the work done in the laboratory. The shop is well fitted up with tools, power being supplied from a ten-horse power Armington & Sims engine with independent boiler, which drives the Edison dynamo, Reed engine lathe, five-foot planer, grindstone and emery-wheels. In the shop are executed all repairs and alterations of apparatus, and in addition is constructed the new apparatus requiring continual experiment. Most of the principal pieces of apparatus belonging to this department have been here constructed. In this manner, by having a mechanic always present, an extremely great economy in time and money is effected, and vexatious delays, which would otherwise completely arrest the progress of the work, are avoided. Facilities are also given for the students to construct apparatus for themselves.

The Library.

Among the most important of the facilities of any department is of course to be named the library, and among the first questions naturally asked may be expected those relating to the accessibility of books to students and the conditions regarding their use. The University Library is open from 8 A. M. to 6 P. M., and any number of books may be taken out by any person, and kept ten days, and then renewed for a similar period. Books on any particular subject may be reserved by an instructor, and may be then taken out only over night. Free access to the shelves is granted, so that the maximum usefulness may be had from the books. The books are arranged on the shelves by subjects, corresponding with a card catalogue, so that a glance will show whether a book is in its place.

The library of the Physical Department, though not imposing as regards size, is carefully selected, and while the number of

volumes might be doubled with advantage, their usefulness would hardly be increased in the same ratio. In mathematical physics particularly, the library may fairly be said to contain the best works. Among others may perhaps be mentioned:

Collected Writings of Helmholtz, Kirchhoff, Kelvin, Green, McCullagh, Joule, Stokes, Maxwell, Rayleigh, Gauss, Fourier, Laplace, Cauchy, Foucault, Fresnel.

Potential, Electricity and Magnetism. Riemann, Betti, Dirichlet, Mathieu, Somoff, Kirchhoff, Neumann, Minchin, Routh, Clausius, Duhem, Maxwell, Boltzmann, Drude, Mascart and Joubert, Watson and Burbury, Gray, Heaviside, Thomson, Poincaré.

Elasticity. Mathieu, Ibbetson, Love, Todhunter and Pearson, Williamson, Clebsch, Neumann, Lamé, Boussinesq, Résal, Poincaré.

Hydrodynamics. Bassett, Lamb, Kirchhoff, Neumann, Poincaré, Wien.

Light. Mascart, Kirchhoff, Helmholtz, Neumann, Volkmann, Résal, Poincaré, Bassett, Preston, Drude.

Heat. Clausius, Kirchhoff, Rühlmann, Boltzmann, Bertrand Zeuner, Poincaré, Preston.

Sound. Rayleigh, Donkin.

A large number of treatises on Mechanics, and a set of the Travaux et Mémoires du Comité International de Poids et Mesures, and of the published memoirs of the Physikalisch-technische Reichsanstalt, may be also mentioned.

Among the journals are complete sets of the

Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Comptes Rendus.
Philosophical Transactions.
Proceedings Royal Society.
Philosophical Magazine.
Physical Review.
Journal of Physical Chemistry.
Nature.
Science.

The library subscribes to the following journals:

American Journal of Science.
Philosophical Magazine.
Philosophical Transactions.
Proceedings Royal Society.
Physical Review.
Journal of Physical Chemistry.
Science Abstracts.
Electrician.
Electrical World.
Nature.
Science.
Annalen der Physik und Chemie.
Beiblätter zu den Annalen der Physik und Chemie.
Zeitschrift für Instrumentenkunde.
Verhandlungen der Deutschen Physikalischen Gesellschaft.
Journal de Physique.
Comptes Rendus.

III.

CHEMISTRY.

No courses will be offered in this department during the year 1901–1902.

IV.

BIOLOGY.

Programme of Work for Year 1901–1902.

Dr. Hodge will offer the following courses:

I. General Biology. This course is intended to give in general outline the fundamental principles of biological science. A general classification of plants and animals will be given, with description of structural and physiological characteristics, through a series of typical organism. The topics: *Methods and aims of biological research, origin of living matter, organization, growth and reproduction, heredity, differentiation* and *evolution* will be treated in order. The active side, the life, habits, instincts, rhythms of functional activity as seen in reproductive cycles and in sleep and waking, will be given special prominence in connection with each type studied. In fact, it is intended to make this for the first time a course on the elements of dynamic biology; each order, genus and type being studied largely with reference to its life work as a force in the economy of nature. It is further proposed to combine with this a discussion of the *principles of elementary biological instruction* together with outlines of a course in nature study for the public schools. One or two lectures weekly, October to June. Laboratory work will be arranged to suit the requirements of those taking the course.

A biological seminary will meet one evening weekly throughout the year.

PHYSIOLOGY AND NEUROLOGY.

It is intended to arrange physiological courses in such a manner that the general field may be covered in two years. This will leave the student free to devote his entire time during the third year to special study in the

literature of the science and to the prosecution and completion of his thesis work.

The general subject will include lectures, reading courses, demonstrations and laboratory work in the following lines:

1. Muscle and nerve.
2. Nutrition, including digestion, blood and lymph, circulation and respiration, and excretion.
3. Brain.
4. Skin and sense organs.
5. Reproduction.

During the work in each of these divisions, the microscopical structure of the organs concerned as well as the physiological chemistry connected with their action, will receive special attention.

Courses in Physiology for the year 1901–1902 will be offered as follows:

II. Physiology of Nutrition.

III. Physiology of Reproduction.

By way of supplementing the above and courses in other departments of the University, three special courses have been planned as follows:

IV. Practical Histology. The course will be purely a laboratory course, with such lectures, directions and conferences as may be required by those taking it. It will be arranged practically to meet the needs of individual students. Considerable latitude will be given, so that any who wish may make it a comparative study by way of supplementing course I, prepare a series of demonstrational specimens for themselves, or devote their time to special problems.

V. For those who do not take work in the laboratory, but desire to see the actual specimens and experiments, a course of demonstrations to run somewhat parallel with the above courses will be offered. One hour weekly, through the year.

Experimental Work.

Laboratory work in both physiology and neurology is arranged to meet the needs of individual students. Its general purpose is to facilitate practical familiarity with methods of research, and as soon as practicable each student is expected to begin an original investigation. Standard apparatus of most improved types are at the disposal of the laboratory, and where new work requires specially devised apparatus, every effort within the means of the department is made to obtain it. A workshop supplied with lathe and good equipment of tools for working both wood and metal is attached to the laboratory, and with these facilities minor pieces of apparatus may be well made or old apparatus altered to suit the demands of new problems. The aim of the laboratory is thus to place at the disposal of men interested in the solution of physiological and neurological problems the best obtainable facilities for the prosecution of their work. In case a man has not decided on a special line of research, the resources of the department are such that he will be given a fairly wide range of problems, from which he may select a subject suited to his tastes and attainments. A course in biology, such as is given in our best colleges and State universities, is sufficient to enable students to begin work here.

It is proposed during the year to focus attention somewhat upon the study of animal activity, normal rhythms of rest and work in a series of animals as related to structure and physiological condition of the nervous system. Incidentally this will include the gathering of data as to functions and work of animal species.

While no regular laboratory fees are charged, each student is expected to refund to the laboratory the cost price of all the more expensive reagents, including alcohol, ether, chloroform, formalin, celloidin, and the like. Each student must supply his own microscopical glass, slides and covers, and must pay the cost price of all glassware which he breaks. All students are enjoined to take the best possible care of all apparatus entrusted to their charge, and to return it to the laboratory clean and in good order.

The library of the department has been selected with two important considerations in view. The first of these has been to obtain the standard classics in the science. The second is to keep abreast of the times by having the best recent literature readily accessible both for study and reference. This latter class of selections thus includes monographs and text-books and current numbers of journals, with complete files of many of the more important. A complete set of indexes, Jahresberichte and Centralblätter greatly facilitates the work of referring to the literature of topics under investigation in the laboratory.

The Journal Club meets weekly, for the purpose of reporting and discussing important articles in the current periodicals.

BIOLOGICAL JOURNALS.

Anatomischer Anzeiger.
Annual of the Universal Medical Sciences.
Biologisches Centralblatt.
Brain (complete in medical library).
Centralblatt für Nervenheilkunde und Psychiatrie.
Centralblatt für Physiologie.

Index Medicus. *Complete*, with Index Catalogue of the Library of the Surgeon-General's Office.

Jahresberichte über die Fortschritte der Anatomie und Physiologie (1873). Complete.

Jahresberichte über die Fortschritte der Reinen Pharmaceutischen und Technischen Chemie, etc., 1847-1887.

Jahresberichte über die Leistungen und Fortschritte in der Gesammten Medicin, Virchow and Hirsch.

Royal Society Catalogue of Scientific Papers, complete.

To the above may be added the four following taken by the Green Library, and accessible to students, viz.:

Centralblatt für die Medicinischen Wissenschaften, complete.

Morphologisches Jahrbuch, complete.

Monatsschrift, International, für Anatomie und Histologie.

Schmit's Jahrbücher der in-und ausländischen gesammten Medicin.

Abhandlungen der math.-phys. Cl. d. k. b. Akad, der Wissenschaften zu München, 1860.

Abhandlungen der math.-phys. Cl. der k. sächsischen. Gesellschaft der Wissenschaften. Leipzig, 1852-88.

American Journal of Physiology, complete.

American Journal of Science.

American Naturalist, 1888 to date.

Alienist and Neurologist, 1890 to date.

Annales de l'Institut Pasteur. Vols. 3-5.

Arbeiten a. d. physiologischen Institut Tübingen.

Archiv für Anatomie und Physiologie (1796), complete.

Archiv für Anatomie und Entwickelungsgeschichte, His and Braune, complete.

Archiv für pathologische Anatomie und Physiologie und für Klinische Medicin, Virchow, complete.

Archiv für Ophthalmologie, Leipzig, 1889 (Green Library).

Archiv für Psychiatrie und Nervenkrankheiten, Berlin, 1889 to date.

Archiv für Mikroscopische Anatomie. (Complete set in Green Library.)

Archives de Biologie, 1889 to date.
Archives Italiennes de Biologie. (Complete set in Green Library.)
Archives de Neurologie, 1890 to date.
Archives de Physiologie Normale et Pathologique, 1889 to date.
Archives de Zoölogie Expérimentale et Générale.
Beiträge zur Anatomie und Physiologie von Eckard, 1858–88.
Beiträge zur Pathologischen Anatomie und zur Allgemeinen Pathologie, Ziegler, 1886 to date.
Berichte über die Leistungen in der Naturgeschichte der Niederen Thiere, 1848–53, 57–60, 61–65, 66–69, 70–71, 72–75, 76–79.
Bibliotheca Zoölogica; Taschenberg Lieferungen. 1866+.
Claus Arbeiten aus dem zoölogischen Institut der Universität Wien und der zoölogischen Station in Trieste, 1878.
Deutsche Zeitschrift für Nervenheilkunde, 1891 to date.
Internationale Monatsschrift für Anatomie und Physiologie, 1889 to date.
Johns Hopkins Hospital Bulletins, 1890 to date.
Journal de l'Anatomie et de la Physiologie, 1889 to date.
Journal of the Coll. of Science, Imperial University of Japan, to date.
Journal of the Marine Biological Association of the United Kingdom. Vols. I–III.
Journal of Comparative Neurology, 1891 to date.
Journal of Experimental Medicine, complete.
Journal of Morphology, complete.
Journal of Nervous and Mental Disease, 1890 to date.
Journal of Physiology, complete.
Journal of the Royal Microscopical Society, 1878–96.
Laboratoire d'Histologie du Collége de France, Années 1874, 83–88.
Mathematische und Naturwissenschaftliche Mittheilungen aus den Sitzungsb. d. k. p. Ak. d. Wissen. zu Berlin, 1882–93.
Mind, complete.
Mittheilungen aus der Zoölogischen Station zu Neapel, 1879–88. Vols. I–IX.
Nature, complete.
Frorïep, Notizen, 1822–36, in 50 parts; 1837–46, in 40 parts.

Pflüger's Archiv für die Gesammte Physiologie, complete.
Philosophical Society of Cambridge, Transactions, complete.
Philosophical Transactions of the Royal Society, London (1665), complete with indexes.
Popular Science Monthly, complete.
Proceedings of the Cambridge Philosophical Society (1843). Complete.
Proceedings of the Royal Society of London (1800). Complete.
Quarterly Journal of Microscopical Science, 1889–93.
Ray Society Publications.
Report of the Exploring Voyage of H. M. S. Challenger. Complete.
Revue Scientifique, 1889 to date.
Revue de Médecine. Vol. IX to date.
Studies from the Biological Laboratory, Johns Hopkins University (complete in Green Library).
Studies from the Laboratory of Physiological Chemistry, Sheffield Scientific School, Yale University, 1884 to date.
Verhandlungen der physiologischen Gesellschaft zu Berlin, 1886 to date.
Zeitschrift für Biologie, 1889 to date.
Zeitschrift für Allgemeine Psychiatrie und psychischgerichtliche Medicin, 1888 to date.
Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Complete.
Ziemssen's Handbuch der Speciellen Pathologie und Therapie. Vols. I–XVII.
Zoölogical Record, 1864 to date. Complete.
Zeitschrift für wissenschaftliche Mikroskopie, 1889 to date.

A number of important journals not mentioned in the above list are taken by either the Worcester Co. Medical Library or the Worcester Public Library, and by the courtesy of these libraries are readily accessible.

V.

PSYCHOLOGY.

A complete course in Psychology at Clark University includes the following subjects:

I. Anatomy and physiology of the brain and spinal cord; senses; and other parts of the body, especially the muscles, the organs of the will, so far as they affect psychological powers and processes, with a good general background of Biology. For this a special laboratory is equipped. See Dr. Hodge's announcement.

II. Physiological and experimental psychology, including Reflex Action; Fatigue and Rest; Sleep; Hypnotism; Automatism; Temperaments; Interaction of mind and body generally. Laboratory methods and apparatus for the study of the Senses, Reaction-Time, Memory, Attention, Association, Will, Feelings, etc. For this a special laboratory is equipped. See Dr. Sanford's announcement.

III. Comparative and genetic psychology. Observation and experiments upon the mental processes of lower animals, including both microscopical and larger forms, and especially (when practical) the observation of dawning intelligence during animal infancy; questions of instinct and psychical heredity; and in general the parts of the general field common to biology and psychology. See announcements of Dr. Hall and Dr. Sanford.

IV. Abnormal and morbid psychology, as nature's experiments, *e. g.*, Border-line phenomena as seen in neurotic people, prodigies, and geniuses; Defectives, such as the blind, deaf, criminal, idiotic; Mental and nervous diseases, epilepsy, phobias, neurasthenia, hysteria; Morbid modifications of will, personality and emotion, etc. Special clinical facilities for this work are open to the department in the hospitals and other institutions of the city. See Dr. Hall's lectures and Dr. Meyer's clinic.

V. Anthropological psychology; Myths, Custom and Belief,

Comparative Religion and Psychology of Religion, Primitive Art, and the study of the life of savages and children; Adolescence and senescence; Physical measurements illustrating laws of growth in size and power, etc. See Dr. Chamberlain's laboratory and courses.

VI. Æsthetics and Ethics, the psychology of music, painting, literature, the phenomena and laws of volition and morality.

VII. History of psychology and philosophy, including the chief culture institutions, science, medical theories, Christianity, and education generally. Dr. Hall's historical courses and Dr. Sanford's Seminary.

VIII. Applications of psychology, pedagogy, including mental and moral hygiene and regimen, school organization and methods from kindergarten to university; the sex problem; defectives, etc. Dr. Hall's and Dr. Burnham's courses.

The aim of the Psychological Department is to cover this field as well as its instructors are able to do in two or three years.

The Psychological Laboratory consists of a suite of five rooms on the second floor of the main building (one large and four small), together with another on the third floor. The large room is used as a general laboratory and instrument room; of the small rooms, one is used as a room for chronometric experiments, the second as the office of Dr. Sanford, the third as a battery room, and the fourth as a store room for apparatus. The large room on the third floor is used for comparative psychology. Other rooms in the building are also used by the department as need requires.

The department is well supplied with apparatus both for demonstration and research, and has access also to the collections of the physical and biological departments. The collection is especially strong in apparatus for the study of the senses and for psychological time-measure-

ments. Many pieces have been manufactured at the University and a considerable number have been designed here for special researches. The collection is constantly increasing by purchase or construction, especially in apparatus for research.

The Psychological Library is fullest on the topics of EXPERIMENTAL AND PHYSIOLOGICAL PSYCHOLOGY, and especially in their current literature. The section on Criminology and related topics is also full. The following Journals are on file at the University:

Archiv für Systematische Philosophie. International Journal of Ethics. The Monist. Zeitschrift für Psychologie und Physiologie der Sinnesorgane. Annali di Nevrologia. Philosophical Review. Journal of Speculative Philosophy. Mind. American Journal of Psychology. Archivio di Psichiatria, Scienze Penali ed Antropologia Criminale. Revue Philosophique. Philosophisches Jahrbuch. Allgemeine Zeitschrift für Psychiatrie. Annales Médico-Psychologiques. Philosophische Studien. American Journal of Insanity. Quarterly Journal of Inebriety. Journal of Nervous and Mental Disease. Archives de Neurologie. Journal of Comparative Neurology. Rivista Spirimentale di Freniatria e di Medicina Legale. The Psychological Review. Proceedings of the Society for Psychical Research. Journal of the Society for Psychical Research. Centralblatt für Nervenheilkunde und Psychiatrie. Neurologisches Centralblatt. Alienist and Neurologist. American Annals of the Deaf. Journal of Mental Science. Medico-legal Journal. Rivista Critica di Filosofia Scientifica. Brain.

Beside these and a large number of medical and other scientific periodicals, the following physiological journals, which frequently contain psychological articles of the first importance, are at hand: Archives de Physiologie. Archiv für Physiologie (Du Bois-Reymond). Archiv für die gesamte Physiologie (Pflüger). Centralblatt für Physiologie. Journal of Physiology. American Journal of Physiology. Journal of Experimental

Medicine. Biologisches Centralblatt. In the Public Library of the city, to which students have easy access, are also the Archiv für Ophthalmologie and the Archiv für Psychiatrie und Nervenkrankheiten.

During the academic year 1901–1902 the following courses will be given:

DR. HALL'S COURSES.

Dr. G. Stanley Hall will give the following courses:

I. THE HISTORY OF PHILOSOPHY.

Beginning with the modern period and probably ending with the death of Hegel. While the leading tenets of each chief author and treatise will be set forth, the standpoint will be psychological and all will be regarded as fuller and more adequate expressions of the same content that myth and primitive philosophemes strive to utter, but as themselves not final but tentative towards a still better utterance of the same instincts of the soul now dawning, which makes induction from all these subjective and objective data.

II. GENETIC PSYCHOLOGY.

The study of animal instinct and of children especially before adolescence.

III. THE PSYCHOLOGY OF JESUS.

This course involves a critical consideration of the lives of Jesus and the other literature concerning his person and teaching from the standpoint of modern psychology, from which these subjects have not yet been treated.

IV. SYSTEMATIC PEDAGOGY.

V. SEMINARY, at his Home three hours every Monday evening through the year.

VI. RESEARCH.

DR. SANFORD'S COURSES.

A. EXPERIMENTAL AND COMPARATIVE PSYCHOLOGY. This course will consist of the following:

1. *Psychological Practicum.* Laboratory Practice and Dem-

onstrations with Informal Lectures on Methods, Apparatus, and Results. The aim here is to familiarize the student with the most important kinds of psychological experimentation and to give him a certain facility in handling ordinary apparatus. The experiments upon the senses are selected from Dr. Sanford's "Course in Experimental Psychology;" those upon the time relations of mental phenomena, fatigue, and circulation and respiration are of a similar character. Four hours a week from October to April.

2. *Comparative Psychology.* Microscopic Forms, Ants, Fish, Chick, White Rat and Kitten, or other substitute forms will be observed and subjected to simple experiments. Four hours a week from April to the end of the year.

Both these courses will be given by qualified assistants under the immediate supervision and with the co-operation of Dr. Sanford.

B. General Psychology. This course is intended primarily for students of Pedagogy and others desiring a general and elementary account of the subject. Lectures and demonstrations. One hour a week throughout the year.

C. Advanced Psychology.

1. *The Pedagogy of Psychology.* The work in this course consists of discussions on the special pedagogy of the subject, the writing by the students of briefs for lectures, and the criticism of the briefs by the instructor. The course is intended for second year students. One hour a week throughout the year.

2. *Psychological Seminary.* Short lecture courses on special topics. Readings from the psychological classics. Discussion of topics of current psychological interest. The work in the Seminary is informal and is varied to suit the needs of those attending it. One hour a week throughout the year.

3. *Original Research.* Advanced students are directed in their work by Dr. Sanford in co-operation with Dr. Hall and Dr. Burnham. The laboratories are open for advanced work at times suited to the convenience of those engaged in it.

D. Psychological Journal Club. Reports and discussions of current psychological literature. Open to all members of the department. One hour a week throughout the year.

PSYCHIATRY.

Dr. Adolf Meyer's Course.

The extent of the course is as yet uncertain. It is expected to cover an analysis of the methods of obtaining the principal data of neurological and psychiatrical disorders.

1. Critical review of what data can be obtained from the history of a patient.

2. The nature and bearing of the symptoms which give information on the condition of the nervous system generally, with demonstration of cases and of anatomical preparations.

3. A summary of the "psychogenous" physical conditions in hysteria, etc.

4. Demonstration of a number of types of mental disorders with analysis of the methods of registration of the observed facts at the Worcester Insane Hospital.

5. A short review of the principles of co-ordination of the biological sciences in the empirical field of psychiatry.

Anthropology.

Dr. Chamberlain will lecture twice a week throughout the year. The following courses will be offered:

A. General, embracing: (a) History, scope and relations of the science of Anthropology. (b) Physical Anthropology. Problems, investigations, results, laboratory work. (c) Ethnography. Races and race-origins. (d) Ethnology, including sociology; origin and development of the arts and sciences; mythology; folk-lore; religions. (e) Linguistics. Race and language. Origin and development of language and of languages. Psychology of language. Gesture-speech and written language. Comparative linguistics. Comparative literature. (f) Criminal and Pathological Anthropology. Ethnic Morals. (g) Historical and Archæological. Primitive Man and Primitive Culture.

B. Special Courses upon anthropological topics most akin to Psychology and Pedagogy, embodying the results of the most recent and important studies and investigations: The Physical

Anthropology of Infancy, Childhood, Youth, Manhood, Old Age, The Anthropological Phenomena of Growth, Arrested Development, Degeneration; Anthropological Aspects of Heredity and Environment in the Individual and in the Race: Uncivilized Races and Civilized Races; The Evolution Problems of Humanity; Education among Primitive Peoples; the Anthropological History of America; the Interpretation of Folk-lore; the Psychology of Primitive Peoples; the Trend of Human Progress.

The lectures in Anthropology will have special bearing upon the courses in Psychology and Pedagogy in the University, and every effort will be made to utilize the latest results of Anthropological investigations.

From time to time, the most important current literature will be reviewed and students made acquainted with the best contributions to anthropological science in the various foreign languages. The importance of a thorough acquaintance with the Bibliography of their subjects is impressed upon all students, and all possible assistance in this direction is always at their disposal.

VI.

EDUCATION.

This has been made a sub-department, and now offers a course which can be taken as a minor for the degree of Doctor of Philosophy. Its work is in the closest connection with the work in psychology and anthropology, and in part based on these. The work in this department is intended to meet the needs of the following classes of students:

First. Those intending to teach some other specialty, but who wish a general survey of the history, present state, methods, and recent advances in the field of university, professional and technical education.

Second. Those who desire to become professors of pedagogy, or heads or instructors in normal schools, superintendents, or otherwise to become experts in the work of education.

The programme of the Educational Department includes courses upon the following subjects:

I. (a) Child Study. (b) Educational Psychology. (c) School Hygiene.

II. (a) Principles of Education. (b) History of Education and Reforms. (c) Methods, Devices, Apparatus, etc.

III. (a) Organization of Schools in Different Countries. (b) The Teaching Profession. (c) Motor Education, including manual training, physical education, etc. (d) Moral Education. (e) Ideals.

The aims, methods and work of the department have

been described in the report of the Decennial celebration of the University, July, 1899 (pp. 161-176).

The courses in Education for 1901-1902 will be as follows:

A. Pedagogical Applications of Psychology. Some of the most important chapters in psychology in their educational aspects, such as habit, attention, memory. The correlation of physical and psychic processes. Education of the senses. Apperception and Association. Diseases of Memory. Experimental investigations and methods in relation to memory. Feeling and interest in relation to instruction and training. Suggestion as a factor in education. The training of the will. Education in productive activity. Some aspects of mental hygiene. Mental diseases and faults of school children. Neuroses of development. Psychological contributions to the hygiene of instruction. *Once a week throughout the year.*

B. Principles of Education. This course treats certain fundamental educational principles and involves also a study of several important chapters in the history of education, with a brief account of a few representative educational systems. Such topics as the following will be included: Educational ideals. The dominant aim at different stages of development. The correlation of educational forces. The family and education. The church and education. State aid and control. The field of scientific study in education. Antithetic educational principles. The history of nature versus convention in Education. Rousseau, Pestalozzi as "pedagogical socialist." Modern Social-Paedagogik. Present problems and tendencies. *One hour a week, half a year.*

C. Recent Movements and Present Problems in Education. This course will involve the discussion of special topics and problems in school hygiene, child study, and educational pathology. Questions concerning correlation, enrichment of the course of study, elimination. The doctrine of interest. Manual training, physical exercise, gymnastics, play. Medical inspection. Discipline. Recent educational literature. *One hour a week, half a year.*

D. Conference, once a week. The work will be determined in part by the needs of the individual students. It is hoped that each student will select, after consultation with President Hall and Dr. Burnham, a topic for special investigation. The results of such studies may be published.

President G. Stanley Hall's Course.

Education. Dr. Hall will offer a course almost entirely new. Beginning with a brief review of systems of marriage from a biological standpoint, including age and mode of life so far as they bear on fecundity, the lectures will summarize the laws of embryonic development, birth customs, treatment of early infancy among different races, the first stages of development, growth, regimen, teething, nutrition, walking, the beginnings of speech and its implication, first efforts at drawing, singing, plays and games, social relations, methods of studying the first stages of childhood. The environment, treatment, and education of children during this period will involve a consideration of the kindergarten.

Passing to the school stage at five or six, the natural history of children from this age to seven or eight will be treated separately under the rubrics of disease and health, exercise, plays, muscular capacity, brain and mind, and school methods will be criticised and educational methods suggested that are demanded by the nature and needs of the child.

The period from seven or eight to eleven or twelve will also be found to require treatment by itself, and the characteristics of this age as involved by studies of children and of primitive man, and their biological and genetic implications will be considered, and on this basis present and ideal educational methods will be discussed. Considerable time will be given to this period, for upon these four years more of the time, money and labor of public education are expended than upon any others. The goal will be the delineation of a grammar school of ideal methods, matter, material equipment, and environment.

The fourth and last part of this course will be devoted to the stage of puberty and adolescence from twelve or thirteen to twenty-four or twenty-five. Here, too, physical and psychic traits

of this most interesting and strangely misunderstood and mistreated age will be considered in the light of the recent rich and illuminating studies of its morbific, criminal, religious, emotional, altruistic, self-ostentatious, rationalistic, ambitious, moody, and other tendencies. This will be followed by a description of methods and matter in high school, college, gymnasia, lycée, and some radical transformations will be advocated, always in behalf of the nature and needs of this stage of human development. The laws of sex will have prominent consideration.

The course will close with a few generalizations concerning the traits and criteria of maximal maturity, when life is at its best, from what stage the higher man of the future will grow, the tendencies and dangers of human development among civilized races, and the determination of ascendant races and the development of other ethnic stocks than our own by colonial and other systems of race education.

One hour weekly, Saturday mornings.

This and Dr. Burnham's Saturday work constitute a teachers' course open to those not members of the University.

The courses as announced above may be modified somewhat as the needs of the students or other circumstances may require.

The library of the department has a large collection of EDUCATIONAL LITERATURE, being especially rich in German and French literature, and having a large number of official reports from various countries—English, French, German, Belgian, Swedish, etc.; also town and city reports, and reports of special institutions; and a collection of French, German, and American text-books.

The books are arranged under the following heads:

1. *Cyclopædias and Books of Reference.*
2. *General Historical Works.*
3. *Histories of Special Institutions.*

4. *General Surveys* and Reports on the Present Condition of Education and Current Discussions.
5. *Standard Writers* on Education and *Biographies*.
6. *Educational Psychology*.
7. *General Works on the Theory of Education*.
8. *Methods in Special Subjects* (Reading, Arithmetic, Geography, History, Music, and the like).
9. *Physical Education and School Hygiene*.
10. *The Study of Children, the Kindergarten*, etc.
11. *The State and Laws*. Civic Education, Administration, and School Organization.
12. *Industrial and Technical Education*.
13. *Miscellaneous*.
14. *School Calendars*, etc.; Annual Reports, Programmes, and the like (mostly foreign).
15. *Education of Defectives*.
16. *Art Education*, including Museums, etc.
17. *The Training of Teachers;* Examinations, etc.
18. *Moral Education* and School Discipline.
19. *University Education*.
20. *The Learned Professions*.
21. *Special Topics*.
22. *Annual and Special Reports of the Bureau of Education and N. E. A.*
23. *Miscellaneous Pamphlets*.
24. *Periodicals*.
25. *Miscellaneous Reports;* a, American; b, English; c, French; d, German, etc.
26. *Text-books;* a, Mathematics; b, Science; c, Drawing, etc.; d, Reading and Writing; e, Language and Literature; f, Geography; g, Music; h, Miscellaneous; i, History.
27. *Old Text-books*, with same sub-divisions as above.
28. *State and City Reports*, sub-divided by States.
29. *Charts, Maps, Pictures*, etc.
30. *Religious Education*.
31. *Nature Study*.
32. *Language and Literature*.

Many of the more common educational books are accessible in the Worcester Public Library and have not been duplicated by the University. The large collection of educational text-books in the library of the American Antiquarian Society and its valuable historical material are also accessible to the University.

The collection of educational periodicals includes a large number of the best foreign journals—English, French, German, Swedish, etc.

The nucleus of an educational museum has been formed, which contains a valuable collection of EDUCATIONAL APPARATUS, pictures and other material for language lessons and *Anschauungsunterricht*, maps, charts, diagrams, models, illustrative material in school hygiene, etc.

The *Pedagogical Seminary* is a journal issued at the University, and serves as a convenient medium of publication for special investigation undertaken in the department.

Special Students in Education.

In addition to the members of the University special students are admitted during the year, to the Saturday courses of Drs. Hall and Burnham in Education, for a fee of $25.

LIBRARY.

The University Library contains about 20,000 bound volumes and 1,500 pamphlets, and the reading-room receives about 200 journals. With the exception of 3,500 Congressional publications and other contributed volumes, the library and the journals represent chiefly the five departments.

The books are grouped as follows:

A Works of General Reference.
B Journals.
C Mathematics.
D Physics.
E Chemistry.
F Zoölogy.
G Physiology.
H Pathology.
I Psychology.
J Philosophy.
K Ethics.
L Criminology.
M Anthropology.
N Education.
O Botany.

Books not included under any of these subjects are grouped as Miscellaneous, and marked according to their room, case, tier and shelf. They comprise, in addition to Congressional publications, bound files of Magazines, several score of rare old books, a collection of art publications, travels, complete works, sets of reports, histories, biographies, etc.

All the privileges of the library are open to all appointees of the University alike.

The library is open from 8 A. M. to 6 P. M., and each member of the University has direct access to every book and journal.

Outside the University are found:

The Library of the American Antiquarian Society, organized in 1812, and containing over 100,000 volumes, is accessible to all members of the University.

The Worcester Public Library, containing about 360 periodicals and over 100,000 volumes, has supplemented the scientific publications purchased by the University, and all its privileges are accessible without charge.

A medical Library of 8,000 volumes is also accessible.

By the courtesy of the Librarian of Harvard University, books from the Harvard College Library are sent to the University for a limited time. Similar privileges have been extended to the University by the Librarian of the Surgeon General's Office, Washington, D. C. By the courtesy of Mr. S. S. Green, of the Worcester Public Library, all the resources of that institution and its facilities for borrowing from distant libraries are available to all members of the University.

LIBRARY RULES.

1. No loud talk is allowed in any part of the library or reading-room.

2. Every book shall be returned at the end of ten days from the time at which it was taken out; at this time it may be renewed for ten days, unless wanted.

3. Any book may be called in at three days' notice at the discretion of the Secretary of the Library Committee.

4. Any member of the staff may reserve from circulation such books as he deems necessary in connection with the courses given in his department; and these shall be placed by themselves and marked "reserved."

5. Current numbers of periodicals shall not be taken out until they have been in the library two weeks.

6. Reserved books and current numbers of periodicals, exempt from circulation, may be taken out after 5.30 P. M., but must be returned before 9 o'clock the next morning, excepting that such books and periodicals may be taken out Saturdays at 12 o'clock M., and may be kept until 9 o'clock the next Monday morning.

7. All dictionaries, cyclopædias, and books of general reference are permanently reserved.

8. Books of great value may be taken out only by special permission.

BY-LAWS.

The President of the University shall preside on all public academic occasions, shall direct the official correspondence, study the wants and interests of the whole University, and exercise a general superintendence over all its concerns. His first care and that of the authorities of the University shall be the departments already established, and next those closely related to them; but no other department shall be established until those already introduced have been brought to the highest state of efficiency then possible. All acts, however, which shall involve the expenditure of money in the administration of the University's affairs, shall be subject to the approval of the Board of Trustees or the Finance Committee for the time being.

As the efficiency of the University depends chiefly upon the quality of its Faculty, the Board of Trustees will hold the President to a strict but reasonable accountability for the fidelity and ability of each instructor. The President only shall have the power to select and appoint all officers of instruction, subject to the approval of the Board of Trustees. To make wise and well considered appointments, to maintain harmony within the Faculty, and to increase their efficiency in research and instruction, shall be his most important duty. If at any time the President shall be negligent in the discharge of these or other duties, or is from any cause disabled from discharging them, they may be exercised by the Board of Trustees.

The President of the University shall be the medium of communication between the Trustees and instructors, individually and collectively, upon all matters within the field of action of either body. He shall attend all meetings of the Board of Trustees, of which he shall be notified, and shall participate in their deliberations, but without the power to vote. All complaints and requests from members of one body to the other shall be made through him.

The President shall call and preside over all official meetings of the instructors, and a record of their proceedings shall be kept. These records are in no case to be made known to others than the Trustees. They shall always be in the custody of the President, but may be inspected by the Trustees, or either of them at any time.

The President of the University, in the absence of the Trustees or Finance Committee, shall have the entire direction and control of the persons employed about the University and not engaged in the work of instruction; the duties of all such persons shall be assigned, and they shall be notified or removed by him, subject to the approval of the Finance Committee.

No instructor shall order any books or apparatus, or anything connected with the work of instruction, without the approval of the President. No expense for the care of buildings or grounds, nor for alterations or repairs within and upon the same, shall be made without the approval of the Board of Trustees or Finance Committee, such alterations or repairs in no case to exceed the appropriations made for that purpose. If the Trustees, or Finance Committee, or any person shall make contracts in behalf of the University without authority, the officer

or person making such contract shall become individually responsible therefor.

Each instructor shall give stated lectures to however few. He shall actively and zealously strive to maintain the highest possible standard, shall work in a spirit of hearty sympathy and co-operation, and shall encourage research by precept, and, if possible, by example.

The foregoing By-Laws are intended to embody the provisions contained in a vote passed by the corporation on the twenty-third day of May, A. D. 1889, upon the motion of Judge Devens. If at any time hereafter any discrepancy shall be found to exist between the two, said By-Laws shall be so far modified as to conform to the provisions of said vote.

No instructor shall engage in any outside professional or technical pursuit without the approval of the Board, the Finance Committee or the President.

These By-Laws, or any one of them, may be changed, amended or repealed by a vote of three-fourths at least of the Trustees at any meeting of their Board duly called, notified, and held for that purpose.

REGULATIONS.

1. All requisitions for apparatus and books must be made through the University office upon printed blanks provided for that purpose, and, except in the case of docents, signed by a member of the staff.

2. So far as possible, orders for only the kind and amount of apparatus certain to be used during the year shall be placed; nothing shall be ordered for future years,

and apparatus for research shall take precedence over that for teaching and illustration only.

3. A book shall be kept for each department, containing a complete list of apparatus and supplies, with itemized cost. With the aid of this book, a complete inventory of the stock shall be made once a year, and whenever else the President shall direct.

4. Requisitions for repairs, furniture, plumbing and work about the buildings must be made in writing and with detail, and must be approved by the Building or Finance Committee, or such person or persons as they may authorize. When once thus passed upon, no change involving additional expense can be made in the requisition without the consent of the Finance Committee.

5. No unappropriated rooms and no part of the University grounds shall be used for any purpose, and appropriated rooms shall not be used for other purposes than the stated University work for which they were intended, without previous permission from the office.

6. Unless for special reasons, absence of instructors from their stated exercises or from town for two consecutive week days, in term time, should be announced at the office, and for longer absence permission should be obtained beforehand.

7. The Trustees desire that no instructor, docent or fellow shall enter upon other engagements outside his proper work in the University of a kind or amount likely to lessen his full efficiency for science within the University.

The following additional rules were passed by the

Board of Trustees, at a meeting held April 4th, 1891, to take effect for the next academic year.

8. Appropriations shall hereafter cover all apparatus and supplies of whatever nature for laboratories, for demonstration or illustration; all metal and carpenter work connected with the scientific activity of each department, and every form of special service. Appropriations, however, shall not hereafter cover books or journals, which shall be submitted to the Library Committee.

9. The several appropriations made to individual instructors and others shall be the full and fixed limit of the liability of the University, to be on no account transcended, and for every excess over the appropriations, from whatever cause, the instructor making the order shall be personally responsible.

10. No order for any purpose shall be paid by the University, whether on appropriations or for general supplies, that has not passed through the University office.

PUBLICATIONS CONNECTED WITH THE UNIVERSITY.

I. The First Official Announcement, May 23, 1889.

II. The Addresses and Exercises at the opening of he University, October 2nd, 1889.

III. Register and Second Official Announcement, May, 890.

IV. First Annual Report of the President to the Board of Trustees, October 4, 1890. This contains the irst statement of the plan, aims, and methods of the University, and reports upon the original investigation of each department from each member who has made such.

V. Register and Third Official Announcement, April, 1891.

VI. Second Annual Report of the President to the Board of Trustees, September 29, 1891.

VII. Register and Fourth Official Announcement, April, 1892.

VIII. Third Annual Report of the President to the Board of Trustees, April, 1893. Contains a full report of the work done in each department since the opening of the University. Pp. 168.

IX. Register and Fifth Official Announcement, May, 1893.

X. Programme of the work of the Summer School at Clark University (July 16 to 28, 1894).

XI. Register and Sixth official Announcement, May, 1894.

XII. Summer School Programme (July 15 to 27, 1895).

XIII. Register and Seventh Official Announcement, May, 1895.

XIV. Summer School Programme (July 13 to 25, 1896).

XV. Register and Eighth Official Announcement, April, 1896.

XVI. Summer School Programme (July 19 to 31, 1897).

XVII. Register and Ninth Official Announcement, April, 1897.

XVIII. Summer School Programme (July 13 to 27, 1898).

XIX. Register and Tenth Official Announcement, April, 1898.

XX. Summer School Programme (July 13 to 26, 1899), April, 1899.

XXI. Register and Eleventh Official Announcement, April, 1899.

XXII. Clark University, 1889–1899. Decennial Celebration. 8x11 in. pp. 566. Published for the University. Price $5.00. Contains the lectures delivered by Professors Picard, Boltzmann, Cajal, Mosso and Forel at the decennial celebration, July, 1899; also reports by the heads of departments on their aims and ideals, with a list of past and present members of the University and the titles of their published papers.

XXIII. Register and Twelfth Official Announcement, April, 1900.

XXIV. Summer School Programme (July 15 to 27, 1901), February, 1901.

JOURNALS CONNECTED UNOFFICIALLY WITH THE DEPARTMENTS.

THE AMERICAN JOURNAL OF PSYCHOLOGY. This Journal was commenced in November, 1887, and is now edited by G. Stanley Hall, E. C. Sanford, and E. B. Titchener (Cornell University) with the assistance of an international board of co-operators. Each volume contains four numbers of about 150 pages each. Besides original articles, a considerable portion of its space is devoted to careful digests of the important literature in its field. Price, $5 per volume; single numbers, $1.50. Louis N. Wilson, Publisher, Worcester, Mass.

THE PEDAGOGICAL SEMINARY. This Journal was begun in January, 1891, and is edited by the President of the University. It is an international record of educational literature, institutions and progress, and is devoted solely to the highest interest of education in all grades, with digests of important literature of all countries. It is the organ of the Educational Department of the University. Each volume contains from 400 to 500 pages. Price, Vols. 4, 5 and 6, $5 each. Price of earlier Vols. on application. Louis N. Wilson, Publisher, Worcester, Mass.

THE MATHEMATICAL REVIEW. This Journal, of which the first volume is in course of publication, is edited by William E. Story. Its scope includes original research in mathematics, résumés of subjects of a more elementary character, pedagogical and historical sketches, and bibliographical notices. Every volume will consist of six numbers of 96 pages each. Each number contains the portrait of some distinguished mathematician. Price, $5 a volume. Published by the editor, Worcester, Mass.

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